

# SOP Log Sheet

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Received: 5/29/25

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City: Wooster State: OH

FRD/LRD: Allison Robinson  
Submitter

Effective Date: 5/28/25

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(Circle one)

.....  
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**NC STATE**

Juliet Thompson &lt;jthomp24@ncsu.edu&gt;

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**New File Uploaded from ir4project.org**

1 message

**ir4-webapps@ncsu.edu** <ir4-webapps@ncsu.edu>

Thu, May 29, 2025 at 3:37 PM

To: jmazlo@ncsu.edu, jthomp24@ncsu.edu

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**You have new file(s) waiting for you from:**

**Name: Nicole Soldan**

**Email: schroe65@msu.edu**

<https://ir4.cals.ncsu.edu/uploads/OSU%20CFAES%20Weed%20Lab%20SOP%205.0%20Updated.pdf>

**Subject for Email: Updated OH SOPs**

**Comment: Hi Juliet, I accidentally uploaded the wrong SOP yesterday. This is the updated, correct one for OH. Thanks!**

File(s) will stay online until 06/29/2025

# MICHIGAN STATE UNIVERSITY

**TO:** Allison Robinson  
Department of Horticulture and Crop Science, OARDC Weed Lab  
The Ohio State University  
Wooster, OH

**FROM:** Nicole Soldan, IR-4 NC Regional Field Coordinator

**SUBJECT:** STANDARD OPERATING PROCEDURE (5.0) APPROVAL

**DATE:** May 28, 2025 (Effective Date) *MSU* 5-29-25  
Per 40CRF160 Good Laboratory Practice Standards (GLP), this is to notify you that your Standard Operating Procedure (SOP) in use is approved. Please retain this document with your SOP to fulfill GLP requirements.



**IR-4 North  
Central Region  
Field  
Coordinator's  
Office**

**Department of  
Entomology**

1066 Bogue St.  
Rm A448  
East Lansing, MI 48824

SOP	REV #	REVISED DATE		SOP	REV #	REVISED DATE		SOP	REV #	REVISED DATE
1.1	5.0	5-20-25		6.2	5.0	5-20-25		9.5	5.0	5-20-25
1.2	5.0	5-20-25		6.3	5.0	5-20-25		9.6	5.0	5-20-25
1.3	5.0	5-20-25		6.4	5.0	5-20-25		9.7	5.0	5-20-25
1.4	5.0	5-20-25		6.5	5.0	5-20-25		9.8	5.0	5-20-25
1.5	5.0	5-20-25		6.6	5.0	5-20-25		9.9	5.0	5-20-25
2.1	5.0	5-20-25		6.7	5.0	5-20-25		10.1	5.0	5-20-25
2.2	Retired			6.8	5.0	5-20-25		10.2	5.0	5-20-25
2.3	5.0	5-20-25		7.1	5.0	5-20-25		10.3	5.0	5-20-25
2.4	5.0	5-20-25		7.2	5.0	5-20-25		10.4	5.0	5-20-25
2.5	5.0	5-20-25		7.3	5.0	5-20-25		10.5	5.0	5-20-25
2.6	5.0	5-20-25		7.4	5.0	5-20-25		10.6	5.0	5-20-25
3.1	5.0	5-20-25		7.5	5.0	5-20-25		11.1	5.0	5-20-25
3.2	5.0	5-20-25		7.6	5.0	5-20-25		11.2	5.0	5-20-25
3.3	5.0	5-20-25		7.7	5.0	5-20-25		11.3	5.0	5-20-25
4.1	5.0	5-20-25		7.8	5.0	5-20-25		12.1	5.0	5-20-25
4.2	5.0	5-20-25		7.9	5.0	5-20-25		12.2	5.0	5-20-25
5.1	5.0	5-20-25		8.1	5.0	5-20-25		13.1	Retired	
5.2	5.0	5-20-25		9.1	5.0	5-20-25		14.1	5.0	5-20-25
5.3	5.0	5-20-25		9.2	5.0	5-20-25		14.2	5.0	5-20-25
5.4	5.0	5-20-25		9.3	5.0	5-20-25		14.3	5.0	5-20-25
6.1	5.0	5-20-25		9.4	5.0	5-20-25				

# STANDARD OPERATING PROCEDURES

## IR-4 Pesticide Residue Trials

### Fruit and Vegetable Crops

*Revision: 5.0*

**CFAES Wooster Campus Weed Lab**

**Department of Horticulture and Crop Science**

**The Ohio State University**

**College of Food, Agricultural, and Environmental Sciences (CFAES)**

**Wooster, Ohio, 44691**

\_\_\_\_\_  
Allison Robinson  
Field Research Director

\_\_\_\_\_  
*Allison Robinson*  
(Signature)

\_\_\_\_\_  
AR  
(Initials)

\_\_\_\_\_  
5/20/25  
(Date)

\_\_\_\_\_  
Nicole Soldan  
Regional Field Coordinator

\_\_\_\_\_  
*Nicole Soldan*  
(Signature)

\_\_\_\_\_  
NS  
(Initials)

\_\_\_\_\_  
5-28-25  
(Date)

Approved by Field Research Director: 

Date: 5/20/25

Approved by Regional Field Coordinator: 

Date: 5-28-25

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<b>SOP 1.1</b>	
<b>TITLE:</b>	General Requirements for Standard Operating Procedures (SOPs)
<b>PURPOSE:</b>	To provide guidance in development and use of SOPs for field research studies.
<b>SCOPE:</b>	Field pesticide residue studies in the Department of Horticulture and Crop Science at OSU / CFAES Wooster Campus.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. The IR-4 Field Research Director (FRD) will develop standard operating procedures (SOPs) for all phases of the research conducted in support of pesticide registration. Adherence to the SOPs will assure compliance with EPA requirements and Good Laboratory Practices (GLP)</li> <li>2. The individual SOPs together with a directory and SOP Approval Log will constitute the SOP for IR-4 pesticide residue studies at the Department of Horticulture and Crop Science at The Ohio State University/CFAES Wooster Campus.</li> <li>3. The SOP will be reviewed annually and revised as needed. The revisions and their effective dates will be recorded on the SOP approval log, which will be maintained as part of the SOP. The Field Research Director will retain all earlier versions of the SOP.</li> <li>4. The cover page and index page will be approved and dated by the Field Research Director and Regional Field Coordinator (RFC).</li> <li>5. Any deviations from the SOP that would affect the results of a study must be documented in writing and signed by the Study Director.</li> <li>6. The FRD is responsible for annually distributing the current version of the SOP to the RFC. Other study personnel will receive copies of the SOP upon request.</li> </ol>	

## **SOP 1.2**

<b>TITLE:</b>	Annual Review and Revision
<b>PURPOSE:</b>	Record Annual Review and Revisions
<b>SCOPE:</b>	All SOPs

### **PROCEDURES:**

1. The entire Standard Operating Procedures for pesticide residue trials on food crops will be reviewed annually by the Field Research Director. Individual SOPs will be revised as needed. The date of the revision and the number(s) of the SOP will be recorded on the SOP Approval Log.
2. The revision number for the entire SOP document will be changed (e.g. 1.0,2.0, 3.0) if any individual SOPs are revised.
3. The FRD will sign and date a new title page after review and revision is complete.



## SOP 1.3

<b>TITLE:</b>	Definitions for the SOP
<b>PURPOSE:</b>	To define the terms used in this SOP
<b>SCOPE:</b>	All SOPs developed by FRD

### PROCEDURES:

1. In all SOPs developed under the SOP, the following terms will have the meanings specified.
  - a.) Batch – a specific quantity or lot of a test substance that has been adequately characterized.
  - b.) Experimental Start Date – the first date the test substance is applied to the test system (crop).
  - c.) Experimental Termination Date – the last date on which data is collected from a study.
  - d.) Good Laboratory Practices – (GLP) a set of guidelines mandated by Congress to which researchers must adhere to ensure the integrity of the research data.
  - e.) Master Timetable – a list of trials, which is maintained by the Field Research Director. It must be indexed by test chemicals and crop, and contain type of trial, approximate experimental start dates, and termination dates.
  - f.) Master Schedule – a list, maintained by the Quality Assurance Unit, of all studies conducted at the test facility indexed by test substance, and containing the test system, nature of study, date study was initiated, current status of each study, identity of the sponsor, and name of the study director.
  - g.) Protocol – a specific document, provided by the sponsor that contains details for accurate completion of a trial.
  - h.) Quality Assurance Unit – (QAU) any person or organizational element except the Study Director or Field Research Director, who is designated to perform the monitoring duties to assure that the research is conducted according to Standard Operating Procedures and GLP. Regional IR-4 representatives will designate the Quality Assurance Officer (QAO) for IR-4 trials.
  - i.) Raw Data – worksheets, records, memoranda, notes, etc., that are results of original observations and activities of a study. Includes photographs and computer printouts.
  - j.) Research – the collection of information about a particular subject.
  - k.) Sponsor – the individual, corporation, association, academic or scientific establishment, government agency or other organizational unit who initiates and supports, by provision of financial or other resources, a study.
  - l.) Standard Operating Procedure – (SOP) written documentation of routine activities and procedures utilized in research studies.
  - m.) Trial – an experiment in which a test substance (pesticide) is applied under field conditions to determine or help predict its effects, metabolism, environmental and chemical fate, or other characteristics.
  - n.) Frequently Used Acronyms –  
 The Ohio State University (OSU)  
 College of Food, Agricultural, and Environmental Sciences (CFAES)  
 Department of Horticulture and Crop Science (HCS)  
 Field Data Book (FDB) or Electronic Field Data Book (eFDB)

## SOP 1.4

**TITLE:** Numbering Systems for SOPs

**PURPOSE:** To provide a general outline for SOPs via numbering system

**SCOPE:** SOPs developed by Field Research Director

### PROCEDURES:

1. SOPs will be organized using these major headings:
  1. General requirements for Standard Operating Procedures
  2. Personnel
  3. Study Protocol and Experimental Design
  4. Site selection, plot establishment and use of GPS unit
  5. Agronomic practices for field experiments
  6. Application equipment calibration, maintenance, and use
  7. Test substance storage, handling, and records
  8. Safe handling of pesticides and use of safety equipment
  9. Collection of pesticide data, weather data, and other information
  10. Residue sample collection, storage, and shipping
  11. Trial reports
  12. Archives and record storage
  13. Quality Assurance *Heading was retired*
  14. EPA inspection

<b>SOP 1.5</b>	
<b>TITLE:</b>	Format for SOPs
<b>PURPOSE:</b>	To assure a uniform format in development of SOPs
<b>SCOPE:</b>	All SOPs developed by Field Research Director for use in the conduct of field research trials.
<p><b>PROCEDURES:</b></p> <p>The following is the format to be used for each standard operating procedure:</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 60%;"> <p>CFAES Wooster Campus Weed Lab            Department of Horticulture and Crop Science            The Ohio State University            Wooster, Ohio 44691</p> </div> <div style="width: 35%; text-align: right;"> <p>Effective Date:            Revision Number:            Submitted by:</p> </div> </div>	
<b>SOP# (Category number followed by SOP number in numerical order)</b>	
<b>TITLE:</b>	(SOP title)
<b>PURPOSE:</b>	(Brief description of the purpose of the SOP)
<b>SCOPE:</b>	(Determines where and when the SOP is applicable)
<p><b>PROCEDURES:</b> (Describes the operating procedures done from beginning to end so that regulatory personnel can understand what is being done.)</p>	

<b>SOP 2.1</b>	
<b>TITLE:</b>	Personnel
<b>PURPOSE:</b>	To describe personnel involved in pesticide registration trials and their responsibilities under GLP
<b>SCOPE:</b>	All personnel directly involved in the trials
<b>PROCEDURES:</b>  <ol style="list-style-type: none"><li>1. Each individual engaged in the conduct of or responsible for the supervision of a trial shall have education, training, and/or experience to enable that person to perform the assigned tasks.</li><li>2. Personnel involved in research that involves handling pesticides should be trained in accordance with policies and guidelines of The Ohio State University and the state.</li></ol>	

<b>SOP 2.3</b>	
<b>TITLE:</b>	Field Research Director
<b>PURPOSE:</b>	To describe responsibilities of the Field Research Director
<b>SCOPE:</b>	All IR-4 field research trials
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. The Regional Field Coordinator will designate a Field Research Director for each trial. The Field Research Director has immediate and personal responsibility for conduct of a trial, including supervision of all other personnel involved in the trial.</li> <li>2. The Field Research Director will:               <ol style="list-style-type: none"> <li>a. Assure that the trial is carried out according to protocol and good laboratory practices.</li> <li>b. Assure that personnel, resources, facilities, equipment, materials, and methods are available as scheduled for the conduct of the trial.</li> <li>c. Assure that all personnel conducting the trial understand the protocol and SOPs for the trial.</li> <li>d. Maintain a Master Timetable for all IR-4 field research under his control.</li> <li>e. Submit a copy of the Master Timetable to the QAO in a timely manner upon receiving all trial assignments.</li> <li>f. Approve all completed report forms and assure to transfer all raw data to the RFC upon completion.</li> <li>g. Report deviations from protocol or SOPs to Study Director.</li> <li>h. Be responsible for conducting IR-4 field trials</li> <li>i. Respond to all deviations reported by the Quality Assurance Unit</li> <li>j. Develop responses to QA Audits and field live inspections</li> </ol> </li> </ol>	

## **SOP 2.4**

<b>TITLE:</b>	Other Personnel
<b>PURPOSE:</b>	To provide information concerning requirements under GLP for other personnel involved in the trials
<b>SCOPE:</b>	All IR-4 field research trials
<b>PROCEDURES:</b>  1. The Field Research Director will have on file a current summary of training and experience and a job description for all personnel actively engaged in the conduct of a trial.  2. Temporary field workers involved in critical phases of a trial but NOT entering data in the Paper Field Data Book (FDB) or Electronic Field Data Book (eFDB) do not require a CV or training record. However, a separate page should be included on the FDB or eFDB that provides their names, describes the impromptu training that was given and identifies the actions performed in the trial.  3. Occasional or temporary help involved in field preparation, planting, or weeding and cultivation are not considered actively engaged in the trial. These personnel will be supervised by personnel who are actively engaged in the trial.	

### **PROCEDURES:**

1. The Field Research Director will have on file a current summary of training and experience and a job description for all personnel actively engaged in the conduct of a trial.
2. Temporary field workers involved in critical phases of a trial but NOT entering data in the Paper Field Data Book (FDB) or Electronic Field Data Book (eFDB) do not require a CV or training record. However, a separate page should be included on the FDB or eFDB that provides their names, describes the impromptu training that was given and identifies the actions performed in the trial.
3. Occasional or temporary help involved in field preparation, planting, or weeding and cultivation are not considered actively engaged in the trial. These personnel will be supervised by personnel who are actively engaged in the trial.

<b>SOP 2.5</b>	
<b>TITLE:</b>	Organizational Chart
<b>PURPOSE:</b>	To describe requirements for an organizational chart
<b>SCOPE:</b>	All IR-4 field research trials
<b>PROCEDURES:</b>  1. An organizational chart which reflects management of the facility and the reporting lines of the personnel engaged in IR-4 will be developed and kept on file by the Field Research Director.  2. Each entry in the chart should show the name of the person filling that position.  3. The chart must show how the Field Research Director reports to the Study Director and the National Director, the relationship between the QAU and the other parts of the organization.	

<b>SOP 2.6</b>	
<b>TITLE:</b>	Documentation of Training
<b>PURPOSE:</b>	To assure that training for personnel for IR-4 trials is properly documented.
<b>SCOPE:</b>	All personnel actively involved in IR-4
<b>PROCEDURES:</b>  1. All formal education beyond secondary school should be included in each person's vita.  2. Relevant training received at workshops, conferences, etc. should be recorded. A copy of training certificates issued should be retained in personnel files.  3. The Field Research Director will document any other training provided for personnel involved in the trials.	



## **SOP 3.1**

<b>TITLE:</b>	Study Protocols and Experimental Design
<b>PURPOSE:</b>	To describe the normal methodology for obtaining a study protocol and planning an IR-4 field research trial
<b>SCOPE:</b>	All pesticide registration trials
<b>PROCEDURES:</b>  1. The protocol is an official document and must be followed completely to assure that the data generated will be useful in the registration process.  2. The Field Research Director is responsible for meeting all requirements of the protocol.  3. The Field Research Director will prepare a Master Timetable including all major activities of all trials to be conducted at his location in a given year. The Field Research Director will submit the Master Timetable to the Study Director, the Quality Assurance Officer and the Regional Field Coordinator as early as possible. The Field Research Director will maintain a file of annual Master Timetables.	

### **PROCEDURES:**

1. The protocol is an official document and must be followed completely to assure that the data generated will be useful in the registration process.

2. The Field Research Director is responsible for meeting all requirements of the protocol.

3. The Field Research Director will prepare a Master Timetable including all major activities of all trials to be conducted at his location in a given year. The Field Research Director will submit the Master Timetable to the Study Director, the Quality Assurance Officer and the Regional Field Coordinator as early as possible. The Field Research Director will maintain a file of annual Master Timetables.

## SOP 3.2

<b>TITLE:</b>	Deviations from Protocol
<b>PURPOSE:</b>	To provide methodology for dealing with unforeseen changes in protocols or field conditions that preclude complete compliance with the protocol
<b>SCOPE:</b>	Changes or deviations initiated by Sponsor, Study Director, or Field Research Director

### PROCEDURES:

1. For changes in protocol initiated by the Sponsor or Study Director, the Study Director will send a copy of the protocol change form listing specific changes in the protocol to the Field Research Director. The protocol change form should be sent to the Field Research Director before the experimental start date when practical. The protocol change form will be attached to the protocol.

2. For changes in protocol initiated by the Field Research Director, the Field Research Director will prepare a study deviation form and submit it to the Study Director and notify the Study Director by email or phone as soon as possible. The Study Director will determine appropriate action for deviations. Minor deviations that do not significantly change the results of a trial may be accepted.

## **SOP 3.3**

<b>TITLE:</b>	Experimental Design
<b>PURPOSE:</b>	To assure that all efficacy, yield, and phytotoxicity data is statistically sound
<b>SCOPE:</b>	All IR-4 field research trials to support pesticide registration
<b>PROCEDURES:</b>  1. The experimental design as specified by the protocol should be used. Residue trials are normally not randomized. The experimental design used should be documented in the FDB or eFDB.  2. IR-4 does not usually require the Field Research Director to analyze data.  3. Draw a plot map on paper or electronically showing the location of each plot following the directions of the FDB or eFDB. Retain the plot map in the paper FDB or as an uploaded document in the eFDB.	

## SOP 4.1

<b>TITLE:</b>	Site Selections, Plot Establishment and Use of Global Positioning System (GPS)
<b>PURPOSE:</b>	To assure that plots will provide the required data and samples with sufficient uniformity to meet EPA requirements
<b>SCOPE:</b>	All IR-4 field research trials to support pesticide registration

### PROCEDURES:

1. The CFAES-Wooster campus is an extension of The Ohio State University. Sites will be selected that are representative of common production areas for the commodity. The Outlying Agricultural Research Stations provide facilities for OSU scientists to conduct field experiments under the state's various agricultural conditions.

The following OSU/CFAES test sites are available for use in field research trials:

- a) Muck Crops Agricultural Research Station  
4875 SR 103 South  
Willard, OH 44890
- b) North Central Agricultural Research Station  
1165 CR 43  
Fremont, OH 43420
- c) Snyder Farm  
2505 Dover Road  
Wooster, OH 44691
- d) Hort Unit 1  
OARDC/OSU  
Dover Road  
Wooster, OH 44691

2. For each trial, site selection is based on the agronomic practices acceptable for the crop and on the capacity to simulate commercial conditions.
3. Trials may be conducted off OSU property (e.g. on local commercial farms) if necessary. If the trial is to be conducted on perennial fruit crops on a commercial farm, select a reliable grower with planting in good health, managed by accepted agricultural practices with a previous pesticide history that meets protocol requirements.
4. The site shall be large enough to accommodate the required number of replicates, buffer zones, and treatments in accordance with the approved IR-4 protocol.
5. Each test plot must be adequately sized in order to produce marketable yields of sufficient size for sampling and analysis.

6. The site should be located with sufficient isolation to minimize contamination from external sources, such as commercial operations or other research studies.
7. Follow SOP 4.2 to get soil test data
8. If site is on commercial farms, arrangements should be made with the grower for crop destruction and remuneration if a non-registered pesticide is used on their crop.
8. If the commodity is already established, select the site that has a uniform stand.
9. Prepare a plot map showing the location of each plot on the site, the North azimuth and any significant slope. The plot map should contain permanent reference points so that the plots can be relocated after the trial is terminated. Alternatively, the site may be identified by permanent reference points determined by a handheld GPS.
10. Place a stake at the first plot identifying the trial number. Assign each treatment and subplot a number. Number stakes with sufficient information to identify the replicate and treatment assigned to each plot.
11. Identify both ends of each plot with a marker of sufficient visibility to be easily seen throughout the duration of the trial.
12. The Station Manager maintains records of all activities performed by Station or farm personnel and will provide a copy of these records to the FRD at the end of the field season.

## SOP 4.2

**TITLE:** Soil Sampling and Characterization

**PURPOSE:** To describe procedures for taking soil samples for field trial sites

**SCOPE:** All IR-4 fields trials

### PROCEDURES:

1. If the site has had a soil test within the last 5 years, use the results of that test for soil characterization information.
2. If no current soil test is available, take a soil sample during the experimental period using the following methods:
  - a. Using a clean soil probe and clean bucket or plastic bag, take 10-20 random soil samples at a 6-8 inches depth in the field and place samples in clean bucket or plastic bag.
  - b. Once all samples are taken, mix the soil thoroughly in bucket or plastic bag. Fill a soil container with soil from the bucket or plastic bag. Label the container with date, test site and identification number and send it to a certified laboratory for analysis.
3. The certified laboratory will determine soil type and series for the site. If this information is not provided by the laboratory, look up the field location in the appropriate county soil survey report.

<b>SOP 5.1</b>	
<b>TITLE:</b>	Agronomic Practices for Field Experiments
<b>PURPOSE:</b>	To assure that crops grown for pesticide trials are produced following good agronomic practices.
<b>SCOPE:</b>	All IR-4 pesticide trials to support registration
<b>PROCEDURES:</b> <ol style="list-style-type: none"> <li>Resources such as the Station or Farm Manager and/or a current (within 2 years) Ohio Vegetable Production Guide should be consulted to determine the growing conditions of the test crop.</li> <li>In particular, identify the pH and soil fertility requirements of the commodity. Decisions to fertilize will be based on these requirements.</li> <li>For studies to be conducted at OSU Agricultural Research Stations or farms, consult with Station managers prior to start of study to determine scheduling for field preparation, seeding, greenhouse planting, transplanting and other maintenance work to be performed to prepare fields for study.</li> <li>Typically, the Stations provide the following services, based upon the direction provided by the FRD and on the needs of the individual trial: field preparation, tilling, fertilizing, soil or pest treatments, irrigation, seeding and transplanting.</li> <li>Apply maintenance pesticides that will not interfere with the outcome of the trial, as needed, to grow the crop. Record all pesticides applied in the Field Data Book.</li> </ol>	

## **SOP 5.2**

<b>TITLE:</b>	Greenhouse, Shadehouse, and Testing Facilities
<b>PURPOSE:</b>	To Assure that greenhouse and shadehouse facilities are adequate for growing transplants for IR-4 field trials
<b>SCOPE:</b>	All IR-4 field trials in which greenhouse and shadehouse facilities are used for growing transplants

### **PROCEDURES:**

1. Each greenhouse or shadehouse must be sufficiently large enough to contain the plants for a trial. All flats will be labeled for identification and action dates. Appropriate observations will be entered in the paper FDB or eFDB.
2. Plants should be grown under good agricultural procedures to provide acceptable plants for the trials. Plants exhibiting disease or pest problems will be removed from the open greenhouse area and examined to determine the cause of the problem.
3. Apply labeled pesticides as needed to prevent losses due to pests/disease. Do not apply pesticides that may interfere with the chemical analysis of the pesticide under study. If in doubt call the Study Director.
4. Monitoring devices should be installed and verified periodically to insure proper environmental conditions are maintained. Climatic conditions will be measured and recorded during the trial. The greenhouse or shadehouse facility monitoring devices records may be used if GLP monitoring devices are not available.
5. Record fertilization and other practices as necessary to establish the crop.
6. Provide all records of pesticide applications including date the product was applied, active ingredient, and rate.



<b>SOP 5.3</b>	
<b>TITLE:</b>	Seeding and Transplanting
<b>PURPOSE:</b>	To assure that commodities are established following good agricultural practices.
<b>SCOPE:</b>	All IR-4 trials
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Determine the appropriate commodity to use as specified by the study protocol. If the variety is not specified, determine the variety most commonly used in the area by commercial producers (or an equivalent variety) and use it for the study. The OSU/CFAES Station managers may be consulted and assist with determining the variety/commodity to be used.</li> <li>2. The type of crop grown and local commercial practices will determine whether trial plots are direct seeded or transplanted.</li> <li>3. To simulate local commercial practice, use resources such as the Station or Farm Manager and/or a current version of the Midwest Vegetable Production Guide to determine the following:               <ol style="list-style-type: none"> <li>a) target greenhouse plant date for transplants</li> <li>b) target field plant date</li> <li>c) within and between row spacing</li> </ol> </li> <li>4. The Station or Farm Manager will determine and record the type of equipment used to seed or transplant.</li> <li>5. Irrigate or perform other agricultural practices as necessary to establish the crop.</li> </ol>	

<b>SOP 5.4</b>	
<b>TITLE:</b>	Crop Maintenance
<b>PURPOSE:</b>	To assure that commodities are grown under good agricultural practices to provide a uniform crop for observation and harvest.
<b>SCOPE:</b>	All IR-4 field trials
<b>PROCEDURES:</b>	
<p>1. Maintain the commodity in a healthy state and good growing condition throughout the life of the study, as directed by Station managers, commercial production practices and other published guidelines (i.e., current Midwest Vegetable Production Guide).</p> <p>2. Maintenance pesticides may be applied by Station and farm personnel to help prevent losses due to pests. For GLP residue trials, no pesticide should be applied that would interfere with the chemical analysis of the pesticide under study. Contact the Study Director with any questions regarding the use of maintenance chemicals.</p> <p>3. All maintenance pesticide applications should follow current labels and registered uses.</p> <p>4. The Station Manager will maintain records of all maintenance pesticide applications performed by Station or farm personnel and will provide a copy of these records to the FRD at the end of the field season.</p>	

<b>SOP 6.1</b>	
<b>TITLE:</b>	Application Equipment Maintenance and Use.
<b>PURPOSE:</b>	To describe the calibration, maintenance, and use of pesticide application equipment used in experiments in IR-4 research trials.
<b>SCOPE:</b>	All application equipment used in experiments to support pesticide registration.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. All application equipment used for conducting GLP studies should be inspected, cleaned, and maintained prior to the beginning of the field season annually. The records from this maintenance and inspection will be recorded on the site's Equipment Maintenance and Calibration logs on paper or in the electronic logs located in the Facility Files electronic notebook. Pre-season equipment maintenance is described as inspecting all lines, hoses and connections, removing and cleaning all nozzles and screens and performing initial calibration.</li> <li>2. Records noted on the paper or electronic Equipment Maintenance and Calibration Log will designate activities as routine or non-routine.</li> <li>3. Routine maintenance includes regular visual inspection of pumps, hoses, pipes, fittings, regulators, gauges and tanks for obvious wear or potential leaks.</li> <li>4. Non-routine maintenance involves the repair or replacement of any of the above parts.</li> <li>6. Clean and triple rinse the sprayer prior to use at the beginning of each season.</li> <li>7. In the case of equipment failure, malfunction or damage, the remedial action plan will be followed and alternate equipment will be obtained to complete trial requirements. A description of the equipment failure or malfunction will be entered on the paper or electronic Equipment Maintenance and Calibration Log.</li> <li>8. Application equipment will be cleaned after each use to ensure integrity of succeeding applications.</li> </ol>	

## SOP 6.2

<b>TITLE:</b>	Calibration of Hand-carried CO <sub>2</sub> -pressurized Boom Sprayers
<b>PURPOSE:</b>	To set the delivery rate of the sprayer to ensure accurate application of the pesticide.
<b>SCOPE:</b>	All IR-4 sponsored trials where a hand carried CO <sub>2</sub> pressurized sprayer is used in application of pesticides.

### PROCEDURES:

1. Sprayers should be calibrated before each use, or as required by trial protocols and results recorded in the appropriate FDB or eFDB.
2. Visually inspect equipment for obvious wear or potential leaks and repair or replace as necessary.
3. Choose the appropriate nozzle tips to deliver the volume, pressure, and spray pattern required.
4. Pressurize the spray tanks with sufficient CO<sub>2</sub> to maintain the desired pressure throughout the application. Set up the pressure regulator on the CO<sub>2</sub> tank to deliver the desired volume and pressure at the nozzle.
5. To determine whether all nozzles are discharging uniformly, place each nozzle directly over a graduated cylinder or a container and open the trigger valve for a given length of time. Replace nozzle tips that vary more than 5% from the average. Repeat the above procedure until all nozzles are discharging within 5% of each other.
6. When spraying with a single nozzle boom, use even spray nozzle tips and measure the desired bandwidth before spraying the treatment plot.
7. When spraying with a multiple nozzle boom, hold boom at desired height over target to obtain an approximate 30% overlap on each side of the nozzle.
8. Calibrate the boom as follows:
  - a. Calibration calculations are based on information provided in the Spraying Systems Co. Catalog. All fluid delivery calculations are based on the assumption that any XX02 nozzle delivers .2000 gallons of water in a minute at 40 psi, any XX04 nozzle delivers .4000 gallons of water in a minute at 40 psi. To extrapolate to 30 psi, the following formula is used:

$$\frac{GPM\ 1}{GPM\ 2} = \frac{\sqrt{PSI\ 1}}{\sqrt{PSI\ 2}}$$

## SOP 6.2

b. To calibrate the boom and CO<sub>2</sub> pressure regulator, the tank is filled with water and pressurized. The nozzles are placed directly over graduated cylinders or containers and the trigger valve is opened for 10 to 30 seconds. The pressure readings on the CO<sub>2</sub> regulator and spray boom are recorded for each test. Test repeated three times and when the output of each test is within 5% of the mean, the boom is considered calibrated. Calibration results are recorded in the FDB and/or eFDB. The first calibration of the season or those calibrations requiring maintenance and/or repair of sprayer equipment will be recorded on paper or electronic Equipment Maintenance and Calibration logs.

9. Calculate walking speed as follows:

a. Walking speed is calibrated by marking a desired length strip, typically the same lengths as the plot to be treated, and walking it with a full sprayer and timing each trip with a stopwatch until the correct time for the specific length is achieved. Time for the established length is calculated by the following formula or an equivalent formula:

$$\text{Time in second for } X \text{ ft} = \frac{a \times X \text{ ft}}{43,560 \text{ ft}^2/\text{acre}} \times b \text{ gpa} \times \frac{3785.3 \text{ ml/gal}}{c \text{ ml/sec}}$$

*a = effective band width in feet for one nozzle on a boom*

*b = desired volume per acre in gallons*

*c = flow rate of one nozzle in ml/sec at desired pressure*

*X=desired length strip*

b. Speed in miles per hour is calculated as follows or an equivalent formula:

$$\text{Speed in miles per hour} = \frac{\text{desired length ft}}{x \text{ sec}} \div 5280 \text{ ft/mile} \times 3600 \text{ sec/hr}$$

*x = time in second for 100 ft*

## SOP 6.3

<b>TITLE:</b>	Calibration and Use of Tractor-mounted Boom Sprayer
<b>PURPOSE:</b>	To set the delivery rate of the sprayer to ensure accurate application of the pesticide.
<b>SCOPE:</b>	All IR-4 trials where a tractor-mounted boom sprayer is used for pesticide applications.

### PROCEDURES:

1. Visually inspect equipment for obvious wear or potential leaks and repair or replace as necessary.
2. Choose the appropriate nozzle tips to deliver the volume, pressure, and spray pattern required.
3. If applicable, pressurize the spray tank with sufficient pressure to maintain the desired output throughout the application. Set the pressure regulator on the tank to deliver the desired volume and pressure at the nozzle.
4. To determine whether all nozzles are discharging uniformly, place a container under each nozzle to catch the output. Open the valves for a given length of time and measure the output. Do this at least three times. Replace nozzle tips that vary more than 5% from the average. Repeat the above procedure until all nozzles are discharging relatively uniformly.
5. Adjust boom height over target to obtain an approximate 30% overlap on each side of each nozzle.
6. Calibrate the boom as per SOP 6.2 or by using the following equations:  
To convert ml/sec to gallon/minute:  
$$\frac{\text{ml}}{30 \text{ sec}} \times \frac{60 \text{ sec}}{\text{min}} = \frac{\text{ml}}{\text{min}} \times \frac{1 \text{ L}}{1000 \text{ mL}} = \frac{\text{L}}{\text{min}} \times \frac{0.2642 \text{ gal}}{1 \text{ L}} = \frac{\text{gallon}}{\text{min}}$$

OR

$$\frac{\text{ml}}{20 \text{ sec}} \times \frac{60 \text{ sec}}{\text{min}} = \frac{\text{ml}}{\text{min}} \times \frac{1 \text{ L}}{1000 \text{ mL}} = \frac{\text{L}}{\text{min}} \times \frac{0.2642 \text{ gal}}{1 \text{ L}} = \frac{\text{gallon}}{\text{min}}$$
7. Calibrate the tractor ground speed using the formula from SOP 6.2 section 9 or by using the following equations (or equivalent):

To determine a target speed (a speed to travel in order to achieve a certain GPA during application):

$$\text{mph} = \frac{5940}{\text{GPA}} \times \frac{\text{GPM}}{\text{nozzle spacing}}$$

GPM- gallons per minute comes from discharge calibration  
 GPA- value used is a target GPA desired

OR

$$\text{Speed in miles per hour} = \frac{y \text{ ft}}{x \text{ sec}} \div 5280 \text{ ft/mile} \times 3600 \text{ sec/hr}$$

$x = \text{time in second traveled}$   
 $y = \text{feet traveled}$

To determine how fast (pace) you must travel a measured track to achieve the target mph, use the following (or equivalent):

$$\text{Time in seconds to travel track} = \frac{\text{ft} \times 60}{\text{target mph} \times 88} \quad \text{where ft} = \text{length of track used}$$

Calculations and Conversions- cont'd:

1) To convert ft/sec to mph:

$$\frac{\text{ft}}{\text{s}} \times \frac{3600 \text{ s}}{\text{hr}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} = \frac{\text{miles}}{\text{hr}}$$

2) To calculate gallons/acre:

$$\text{GPA} = \frac{5940 \times \text{GPM}}{\text{mph} \times \text{Nozzle spacing (for broadcast)}}$$

8. Record transmission gear and range and engine RPM at which the desired ground speed is obtained. Use these settings for future calibration.
9. Record the time it takes to travel the length of the plot in the paper FDB or eFDB.

<b>SOP 6.4</b>	
<b>TITLE:</b>	Calibration and Use of Granular Applicator
<b>PURPOSE:</b>	To set the delivery rate of the granular applicator of the pesticides
<b>SCOPE:</b>	All IR-4 sponsored trials where a granular applicator is used in the application of pesticides in field research
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Inspect the spreader to determine if it is clean and in good mechanical condition.</li> <li>2. Fill the spreader at least half full of the materials to be applied. Attach a pan under the spreader to catch the material as it is released.</li> <li>3. Measure an area of .01 acre or 435.6 square feet.</li> <li>4. Determine the approximate setting of the openings and the approximate speed to walk for the desired amount of product per acre.</li> <li>5. Operate the applicator over the measured distance and collect the output in the pan attached to the spreader.</li> <li>6. Weigh the material from the pan and multiply by 100 to give the amount applied per acre.</li> <li>7. Continue with step 4 through 6 until desired rate is achieved within 5% of the desired amount per acre.</li> <li>8. Example: You want to apply 10 lbs product per acre. Spreader band width is 10 ft.           <math display="block">\text{Distance to walk} = \frac{435.6 \text{ ft}^2}{10 \text{ ft wide}} = 43.5 \text{ ft}</math> <p>You should apply 1/100 of the amount per acre in this area, or 0.1 lb (45.4 g)</p> </li> <li>9. An alternate method of granular application is to weigh out the amount of product needed per plot, and apply it uniformly with shaker.</li> </ol>	



<b>SOP 6.5</b>	
<b>TITLE:</b>	Cleanup of Application Equipment
<b>PURPOSE:</b>	To ensure that pesticide application equipment is clean to avoid contamination of succeeding trials.
<b>SCOPE:</b>	All IR-4 field research trials
<b>PROCEDURES:</b>  1. Apply any excess pesticide mix or granules to an approved area.  2. Rinse tank with clean water. Place approximately 1 tsp. of tank cleaner in rinsed tank. Add approximately 1 liter of water and mix solution by shaking tank. Spray out cleaner solution through boom. Rinse tank at least 2 more times with water. Fill tank halfway with water and spray out contents through boom.  3. Store portable equipment at the CFAES Wooster Campus pesticide storage facility.	

## SOP 6.6

<b>TITLE:</b>	Remedial Action in Case of Equipment Failure
<b>PURPOSE:</b>	To ensure that a prescribed course of action is followed in case of equipment failure
<b>SCOPE:</b>	All IR-4 field research trials

### PROCEDURES:

1. Equipment is identified as all instruments, apparatus, and implements used to complete measurement, application and assessment for IR-4 field trials. Equipment includes, but is not limited to sprayers, applicators and nozzles, tanks and pressure regulators, temperature monitoring systems, weather monitoring equipment and meters, handheld GPS units, soil probes and samplers, stopwatch, pH meter, freezer, balances used for weighing test substance and sample weights, graduated cylinders, tape measure, and wheel.
2. In the case of equipment failure, malfunctions, or damage, equipment will be repaired, alternate equipment will be secured, or service personnel will be contacted to perform non-routine maintenance to return equipment to working order and complete trial requirements.
3. If a trial is not affected or impacted in any way, it does not need to be noted in the paper or electronic maintenance logs. If a residue trial is impacted by equipment failure, it should be noted in the paper or electronic maintenance logs in all affected trials. At a minimum, documentation of the actions should include the nature of the failure, date of first notice, remedial actions taken, and assessment of potential impact on the trial.

<b>SOP 6.7</b>	
<b>TITLE:</b>	Calibration and Use of Drip Applicators
<b>PURPOSE:</b>	To determine the delivery rate of the drip application and make adjustments as necessary to ensure an accurate application of the pesticide.
<b>SCOPE:</b>	All IR-4 field research trials
<p><b>PROCEDURES:</b></p> <p>Prior to use:</p> <ol style="list-style-type: none"> <li>1. Routine maintenance includes determining that the irrigation lines are in good working order and emitters are in good mechanical condition. Make sure the flow meter is working. If a pressure gauge is present, ensure it is operating properly.</li> <li>2. The injector system is made up of the injector, flow valves, metering valve and a plastic tube with an end filter.</li> <li>3. Check to ensure that there is no off target leakage in the irrigation system. Regardless of the type of irrigation system used, there should be a backflow valve present to prevent the test substance from flowing into the water source.</li> <li>4. Wear protective clothing as necessary.</li> </ol> <p>Use of Drip Applicator:</p> <ol style="list-style-type: none"> <li>1. Pressurize all lines and catch the output of the first emitter, middle emitter, and last emitter on each line. Do this 3 times to confirm all emitters are working consistently with accurate and reproducible results.</li> <li>2. Monitor the pressure gauge during the calibration and application and readjust to the target pressure as needed.</li> <li>3. Determine the amount of test substance to be applied to the plot based on protocol. Calculations can be one to obtain how long to operate the system during and after application to obtain the correct amount of test substance/water and post application irrigation water stated in the protocol.</li> <li>4. Inject the test substance into the lines. Follow this with a volume of water to flush the test substance out of the drip lines into the substrate according to protocol.</li> <li>5. If drip irrigation lines are not available, some protocols allow use of a water can or similar applicator to apply the test substance as a drench around the base of each plant. Placement of test substance should follow protocol guidelines.</li> <li>6. Example calculation for drench application: To apply at a rate of 567ml test substance/acre and protocol states 80ml water/plant followed by ¼ to ½ inch water as irrigation.             <ol style="list-style-type: none"> <li>a. There are 15,000 plants per acre and there are 100 plants in the plot.</li> <li>b. <math>(100\text{plants}/15000\text{plants per acre}) \times 567\text{ml product per acre} = 3.78 \text{ ml for 100 plants.}</math></li> </ol> </li> </ol>	

- c. 80ml/plant x 100 plants=8000ml. 3.78ml test substance in 8 L.
- d. Apply 80 ml per plant in pattern described in protocol.
- e. Follow this application with  $\frac{1}{4}$  to  $\frac{1}{2}$  inch irrigation water.

<b>SOP 6.8</b>	
<b>TITLE:</b>	Borrowed equipment
<b>PURPOSE:</b>	To describe the procedures for using borrowed equipment in a GLP study.
<b>SCOPE:</b>	All IR-4 field research trials
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Depending upon the type of crop grown, local commercial practice and current field conditions, equipment may be borrowed from an outside source, even if that source has not maintained the equipment according to GLP.</li> <li>2. The equipment will be visually inspected to determine whether all parts are in good working order. As applicable, check oil and gas levels.</li> <li>3. If non-routine maintenance, such as the replacement of a leaking hose or gasket, is required, this will be documented.</li> <li>4. Prior to use in a GLP study, the following information regarding the piece of equipment and the proposed use must be documented:             <ol style="list-style-type: none"> <li>a. Study identification</li> <li>b. Owner/source</li> <li>c. Description of equipment (e.g. make, model)</li> <li>d. Year manufactured, if available</li> <li>e. Year acquired, if available</li> <li>f. Purpose of equipment</li> <li>g. Condition upon receipt</li> <li>h. Maintenance performed, if necessary</li> <li>i. Modification required, if necessary</li> <li>j. Cleaning procedure performed</li> <li>k. FRD statement of suitability</li> <li>l. Date of use</li> </ol> </li> <li>5. Personnel documenting the above information must initial and date the form.</li> <li>6. Blank Borrowed Equipment forms will be maintained in the Facility's Records.</li> <li>7. The completed forms will be added to the appropriate paper FDB or eFDB.</li> </ol>	

<b>SOP 7.1</b>	
<b>TITLE:</b>	Test Substance Storage, Handling, and Records
<b>PURPOSE:</b>	To describe the procedures for handling pesticides and documenting all uses
<b>SCOPE:</b>	All IR-4 research trials
<b>PROCEDURES:</b>  1. All personnel involved in handling pesticides should be properly trained in their use and wear appropriate protective equipment as described on the pesticide label.  2. All test substance receipt, application and disposal information must be recorded in the respective paper FDB or eFDB and receipt, transfer, and/or disposal in the facility's paper or electronic Pesticide Log Book.  3. Test substances and additives will be stored in a manner to ensure their integrity and temperature will be monitored.	

<b>SOP 7.2</b>	
<b>TITLE:</b>	Test Substance Request, Receipt, Use, and Disposal
<b>PURPOSE:</b>	To ensure that chemicals used in residue tests are properly received, logged, stored, and disposed of upon completion of the trial.
<b>SCOPE:</b>	All pesticides used in IR-4 field research trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Upon receipt of test substance, record the following information from the container label or product documentation in the respective paper FDB or eFDB: date of receipt, name of individual receiving test substance, carrier and tracking number, batch or lot number, expiration date and source, amount received, container description and condition upon arrival, and GLP status.</li> <li>2. Label test substance container with Field ID #, date received and initials. Make sure to verify the test substance label container or the paperwork received has the following information: Batch or lot number, expiration date and storage requirements. If there is more than one container for a single trial or more than one location using the same test substance, each container should be labeled with a unique number such as 1 of X, 2 of X, etc. An additional label may be attached to the container to document this information.</li> <li>3. If a test substance arrives without an expiration date or evidence of GLP status, contact Study Director immediately.</li> <li>4. The storage conditions (i.e., temperature) of the test substance should be recorded from the time of receipt until the last application of the test substance. Storage temperatures will be inserted in the appropriate paper FDB or eFDB.</li> <li>5. Upon use of a pesticide, record in the respective paper FDB or eFDB the date used, amount used, purpose, and initials of person using the product.</li> <li>6. Upon completion of a trial, extra test pesticide may be disposed of in a legal manner according to the state and OSU's regulations. Record all use or transfer in the paper FDB or eFDB and/or GLP Facility Files.</li> <li>7. Test chemical containers must be stored until indicated by the Food Request Database – Test Substance Container Disposal Approval list from Headquarters found on the IR-4 website. The disposition and/or disposal of containers will be recorded in the facility's IR-4 paper or electronic Pesticide Log Book.</li> </ol>	

## SOP 7.3

<b>TITLE:</b>	Test Substance Storage
<b>PURPOSE:</b>	To describe acceptable storage facilities, and procedures for test chemicals.
<b>SCOPE:</b>	Storage facilities for test pesticides used in IR-4 field research trials.

### PROCEDURES:

1. The chemical storage facility should have limited access and a sign on the door indicating the hazardous nature of the contents.
2. All test chemicals should be stored in a locked cabinet in the chemical storage facility. Store test containers until a disposal date is indicated on the Food Request Database – Test Substance Container Disposal Approval list which is available on the IR-4 website. Keep pesticides from freezing. Data loggers are set to record temperature readings every 30 minutes.
3. Monitor room temperature with a primary and back-up data logger/recorder. Recorders will be replaced or serviced before batteries run out. Annual verification of temperatures from recording devices is performed and recorded on paper and/or electronic Equipment logs. Deviation from standard is acceptable within 2 °C. Have a spill kit accessible in the pesticide storage facility.



## SOP 7.4

<b>TITLE:</b>	Adjuvant Storage and Maintenance
<b>PURPOSE:</b>	To describe the procedures for labeling, handling, and storage of adjuvants.
<b>SCOPE:</b>	All IR-4 field residue trials

### PROCEDURES:

1. Adjuvant containers will be marked with the date of receipt, initials of the person who received the containers, the date that the container was opened, adjuvant name, concentration, storage conditions, and expiration date. If an expiration date is not provided, an expiration date of 5 years plus the date of receipt will be assigned.
2. A secondary container may be used for storage for ease of use and transport to remote sites. This secondary container must be properly labeled per the original container and will take on all requirements and properties of an "original container."
3. All adjuvants used for IR-4 research trials will be stored in a locked cabinet within a limited access facility. The cabinet temperature will be monitored with primary and back-up loggers.
4. Before use in an application, adjuvants will be inspected for quality. If there appears to be any changes or if there is any suspicion of contamination, the adjuvant will be discarded.
5. Adjuvants will be handled in a manner to prevent cross contamination with test substances and other spray additives.
  - a. Liquid spray additives may be dispensed into a clean graduated cylinder for measuring. After dispensing from the original or secondary container excess spray additive will not be returned to the original or secondary container.
  - b. Dry spray additives may be dispensed into a clean plastic measuring boat, using a clean plastic spoon if necessary, and weigh on a certified balance.

## SOP 7.5

<b>TITLE:</b>	Calculating and Measuring Liquid Pesticides.
<b>PURPOSE:</b>	To ensure an accurate dosage of liquid pesticides in IR-4 field research trials.
<b>SCOPE:</b>	All IR-4 field trials using liquid formulations of pesticides

### PROCEDURES:

1. Make all applications in a spray volume recommended by the protocol or as recommended by the study director. Make a minimum of 1 liter of spray mix for each treatment.
2. Calculate the amount of liquid pesticide needed per volume of spray mix by the following formula or an equivalent formula:

$$\begin{aligned} & \text{Total ml. of pesticide required} \\ &= \frac{\text{rate lbs ai/acre}}{\text{lbs ai/gal}} \times \frac{3785.3 \text{ ml/gal}}{\text{gal. spray volume/acre}} \times \text{gal. needed for spray} \end{aligned}$$

3. Obtain a clean graduated cylinder that is of a volume appropriate to the quantity of pesticide required.
4. Read the level of the liquid in the cylinder at the bottom of the meniscus. Record the amount actually measured. After dispensing the test from the original container, excess material will not be returned to the original container.
5. Record the amount of pesticide removed from the container and the purpose of use in the Test Substance Records Use Log of the paper FDB or eFDB. Record the amount of test substance, carrier, and adjuvant in Application Record of the paper FDB or eFDB.
6. Triple rinse all measuring devices with water after each use. Use soap or tank cleaner if available.

<b>SOP 7.6</b>	
<b>TITLE:</b>	Calculating and Measuring Dry Pesticides.
<b>PURPOSE:</b>	To ensure an accurate dosage in the application of dry pesticides in IR-4 field research.
<b>SCOPE:</b>	All IR-4 field trials using dry formulations of pesticides.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Make all applications in a spray volume recommended by the protocol or as recommended by the study director. Make a minimum of 1 liter of spray mix for each treatment.</li> <li>2. Calculate the amount of dry pesticide needed per volume of spray mix by the following formula:  <math display="block">\text{Total grams of pesticide required} = \frac{\text{rate lbs ai/acre}}{\% \text{ ai (as a decimal)}} \times \frac{453.6 \text{ g/lb}}{\text{gal. of spray volume/acre}} \times \text{gal. needed for spray}</math> </li> <li>3. Calibrate and check the balance according to SOP 7.7.</li> <li>4. Unless the protocol specifies, otherwise, place a clean transfer container on the balance and tare it. Remove the dry pesticide from its original container to the transfer container with a clean spatula, spoon, or other appropriate device. Measure the pesticide to a marked, sealable portable container. After dispensing test substance from primary container, excess material will not be returned to the original container.</li> <li>5. Mark the portable container with the name of the chemical, amount, date and FID #.</li> <li>6. Triple rinse devices and reusable containers with water after each use.</li> <li>7. Record in the Test Substance Records Use Log of the paper FDB or eFDB the amount of pesticide removed from the container, the purpose, initial and date.</li> </ol>	

<b>SOP 7.7</b>	
<b>TITLE:</b>	Calibration of an Electronic Balance for Dry Pesticide Measurement.
<b>PURPOSE:</b>	To ensure an accurate dosage in the application of dry pesticides.
<b>SCOPE:</b>	IR-4 trials where a dry material is weighed for use in field research.
<b>PROCEDURES:</b>  1. Prior to each weighing event, set up and level balance. Visually inspect electronic balance for cleanliness. Wipe with clean moist cloth as needed.  2. Calibrate the balance by first establishing zero followed by weighing standard weights that bracket to the nearest amount of test substance needed. Record in the paper FDB or eFDB the date, standard weights used and recorded weights and initials of person performing this task. If the balance does not weigh within one percent of the standard weight, service will be called and another balance used. Tare balance with weighing receptacle in place and weigh test substance. Record amount of test substance removed in paper FDB or eFDB.  3. The Field Research Director is responsible for inspection, maintenance and calibration of the electronic balance. Balance shall be serviced and calibrated at a minimum of every two years.	

<b>SOP 7.8</b>	
<b>TITLE:</b>	Application of Pesticides in the Field.
<b>PURPOSE:</b>	To apply pesticides accurately in the field to meet requirements for GLP.
<b>SCOPE:</b>	All IR-4 field research trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Clean water will be used as a carrier for all applications.</li> <li>2. Make a minimum of 1 liter of spray mix for each treatment. Increase the amount mixed as needed in increments.</li> <li>3. Measure each liter of water using a clean graduated cylinder or other measuring devices. If using a liquid pesticide or adding a liquid adjuvant, discard an amount of water equal to the volume of the test chemical and adjuvant to be added.</li> <li>4. The pH of the water will be determined by a pH meter or by using pH strips and recorded in the paper FDB or eFDB.</li> <li>5. Pour about half the water into the spray tank. Add the test chemical to the tank. Rinse the measuring device or container three times with water and pour the rinsates into the tank. Then add the rest of the water to the tank.</li> <li>6. If applicable, spray the material beginning with the lowest concentration and continuing with higher concentrations up to the highest concentration.</li> <li>7. Proceed at the correct speed toward the plot and turn on the sprayer upon entering the plot. Maintain the correct speed throughout the plot.</li> <li>8. Turn off the sprayer at the end of the plot.</li> <li>9. Record pass times in the paper FDB or eFDB.</li> <li>9. Any excess substance should be disposed of according to the current policies and guidelines of the research testing facility.</li> <li>11. Record weather data at time of application, including air temperature, soil temperature, wind direction and speed, relative humidity, sky conditions, soil surface moisture, and plant surface moisture. Keep a record of all precipitation, irrigation, and air temperatures for the duration of the trial.</li> </ol>	

<b>SOP 7.9</b>	
<b>TITLE:</b>	Procedures for Problems during Application of Test Chemicals.
<b>PURPOSE:</b>	To explain the procedures to handle problems that may occur during the application of the test chemical that could affect the integrity of the trial.
<b>SCOPE:</b>	All IR-4 field research trials
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. The applicator should observe all aspects of the application to make sure that the test chemical is distributed accurately.</li> <li>2. If there is a problem with the spray equipment, the operator should take immediate action to correct the situation. See SOP 6.6 procedure 2.</li> <li>3. If a portion of the plot has been compromised, clearly mark off affected area and promptly contact the Study Director. Along with the Study Director, a plan can be formulated to determine the most appropriate way to proceed.</li> <li>4. The Regional Field Coordinator and the Study Director should be notified by phone or email of the incident and details should be recorded in the paper FDB or eFDB.</li> </ol>	

<b>SOP 8.1</b>	
<b>TITLE:</b>	Safe Handling of Pesticides and Use of Safety Equipment.
<b>PURPOSE:</b>	To ensure that pesticides are handled safely and that personnel are protected by adequate safety equipment.
<b>SCOPE:</b>	All IR-4 field pesticide trials.
<b>PROCEDURES:</b> <ol style="list-style-type: none"> <li>1. All personnel involved in field pesticide experiments will be properly trained in the safe use of spray equipment and pesticides.</li> <li>2. When applying or mixing pesticides, wear protective equipment as described and required on the pesticide label. This equipment may include rubber gloves, boots, coverall, goggles, hat and respirator.</li> <li>3. Do not apply pesticides when winds exceed 10 mph. Apply pesticides with the wind to your back or side whenever possible.</li> <li>4. Always have clean water available while handling pesticides to wash off pesticides that contact exposed skin and eyes.</li> <li>5. Upon completion of the application wash all exposed skin with soap and water.</li> <li>6. Clean safety equipment and let it dry before placing it into storage.</li> <li>7. Clothing worn during pesticide application should be washed or disposed at the end of the day.</li> </ol>	

<b>SOP 9.1</b>	
<b>TITLE:</b>	Collection of Pesticide Data, Weather Data, and Other Information.
<b>PURPOSE:</b>	To obtain accurate and complete data for pesticide registration.
<b>SCOPE:</b>	All IR-4 field trials for pesticide registration
<b>PROCEDURES:</b>  1. Collect and record all data in accordance with good scientific practices.  2. Follow all guidelines in this SOP and the respective protocols to meet the requirements for GLP.	



<b>SOP 9.2</b>	
<b>TITLE:</b>	Recording, Handling, and Storage of Raw Data
<b>PURPOSE:</b>	To assure that data is recorded, handled and stored properly
<b>SCOPE:</b>	All IR-4 field research trials
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Data is defined as values obtained from measuring, counting, or rating.</li> <li>2. It is the responsibility of the Field Research Director to ensure that all raw data, summaries and other items connected with the study are properly entered and stored in the paper FDB or eFDB.</li> <li>3. Electronic data and charts from monitoring devices may be kept as electronic files and uploaded to the eFDB or the electronic Facility Files after the information is generated. Alternatively, copies of the electronic data may be printed and kept in the paper Facility Files and/or when applicable, in the paper FDB. The electronic file generated and downloaded from the monitoring devices is considered the original document from which extra copies are made.</li> <li>4. All data will be recorded in the paper FDB in indelible ink or eFDB. Blue ink is preferred to distinguish original documents from copies. All entries must be dated and initialed.</li> <li>5. Corrections will be made by crossing through the item with one line, initialing and dating it, and writing a short explanation for the change. Error codes in the IR-4 paper FDB or eFDB should be used whenever possible to explain the change.</li> <li>6. Paper pages or electronic files containing raw data should not be removed from the paper FDB or eFDB. Paper copies of blank forms may be added to the paper FDB book as needed. Verified copies of data from other trials may be added following requirements on the form.</li> <li>7. Give the location of the original data if true copies are included in the paper FDB and in the electronic files uploaded to the eFDB.</li> <li>8. Make sure that all data required by the study protocol or by the forms provided is collected and recorded. Carefully review the forms provided with the protocol to make sure that all required data is being collected.</li> <li>9. The Field Research Director will maintain all raw data for the current season in a secure location.</li> </ol>	

## SOP 9.3

<b>TITLE:</b>	Significant Figures and Rounding Numbers
<b>PURPOSE:</b>	To describe a procedure for determining significant figures and rounding numbers
<b>SCOPE:</b>	All IR-4 research trials
<b>PROCEDURES:</b>  1. Retain sufficient decimal places to accurately express the measurements and measuring equipment. Consider the calibration of the equipment used to measure. All measurement numbers will be maintained at the level of accuracy produced by measurement equipment.  2. All numbers derived from instruments and the digits generated from subsequent calculations using these numbers will be carried through the calculations and rounded after the final value is determined.  3. If the last digit is $<5$ the number will be rounded down. If the last digit is $\geq 5$ , it will be rounded up.  4. Report the final value or mean value with the same number of significant figures as the data was taken.	

### PROCEDURES:

1. Retain sufficient decimal places to accurately express the measurements and measuring equipment. Consider the calibration of the equipment used to measure. All measurement numbers will be maintained at the level of accuracy produced by measurement equipment.

2. All numbers derived from instruments and the digits generated from subsequent calculations using these numbers will be carried through the calculations and rounded after the final value is determined.

3. If the last digit is  $<5$  the number will be rounded down. If the last digit is  $\geq 5$ , it will be rounded up.

4. Report the final value or mean value with the same number of significant figures as the data was taken.

## **SOP 9.4**

<b>TITLE:</b>	Collecting Efficacy and Phytotoxicity Data
<b>PURPOSE:</b>	To describe the procedure used for taking biological field data
<b>SCOPE:</b>	All IR-4 field research trials
<b>PROCEDURES:</b>  1. Consult the protocol to determine the method and timing of the phytotoxicity data. If no method is cited proceed as directed in this SOP.  2. For pre-emergence applications, rate crop phytotoxicity 7 and 14 days after crop germination.  3. For post-emergence applications, record crop stand, size, and vigor data the day of the initial herbicide treatment. Rate plots at 7 and 14 days after treatments. If symptoms occur after this period, rate the plots again as needed.  4. Rate all the crop plants in the treatment at one time. Record phytotoxicity on a 0-100 scale: 0 = no injury: 100 = complete kill.  5. Consult the protocol to determine the method and timing of obtaining weed control data. If no method is cited, record the height, number of leaves, and density of the various weed species present the day of the initial treatment. Rate the plots 20 to 40 days after pre-emergence application and 7 to 14 days after post-emergence treatments again as needed.	

### **PROCEDURES:**

1. Consult the protocol to determine the method and timing of the phytotoxicity data. If no method is cited proceed as directed in this SOP.

2. For pre-emergence applications, rate crop phytotoxicity 7 and 14 days after crop germination.

3. For post-emergence applications, record crop stand, size, and vigor data the day of the initial herbicide treatment. Rate plots at 7 and 14 days after treatments. If symptoms occur after this period, rate the plots again as needed.

4. Rate all the crop plants in the treatment at one time. Record phytotoxicity on a 0-100 scale: 0 = no injury: 100 = complete kill.

5. Consult the protocol to determine the method and timing of obtaining weed control data. If no method is cited, record the height, number of leaves, and density of the various weed species present the day of the initial treatment. Rate the plots 20 to 40 days after pre-emergence application and 7 to 14 days after post-emergence treatments again as needed.

<b>SOP 9.5</b>	
<b>TITLE:</b>	Determining Yield and Quality
<b>PURPOSE:</b>	To accurately assess yield and quality, if required by the protocol.
<b>SCOPE:</b>	All IR-4 field research trials in which the protocol requires or encourages yield data.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Check the protocol for information on time of harvest. Note the number of days between treatment and harvest. If none, follow commercial practices in the area for the time of harvest of the commodity.</li> <li>2. Harvest a sufficient area of the plot to give a good estimation of the effects of the treatments. Harvest by hand or machine using accepted harvest procedures for the commodity. Weigh and record the yield.</li> <li>3. If quality grading is required by protocol, grade according to USDA or other accepted grading standards and record weight of each portion. Record the grading standard.</li> </ol>	

<b>SOP 9.6</b>	
<b>TITLE:</b>	Collection and Recording of Data from Monitoring Devices.
<b>PURPOSE:</b>	To describe methods for handling data from temperature and weather collection and recording devices.
<b>SCOPE:</b>	All IR-4 field research trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. All automatic data collecting and/or recording devices should be inspected and calibrated as described in SOP 9.7</li> <li>2. Files containing raw data from these devices must be legible to persons with normal vision. The original download of the data from a device is the original document. Reproductions of these documents must be marked as copies. Copies must include the location of the original, initials and date.</li> <li>3. Hard copies of computerized data and/or other written, typed, or plotted data sheets must be retained in the file folder of the trial or if applicable to more than one trial in a separate file in the Field Research Director's archives.</li> <li>4. Each chart or data sheet from a monitoring device should be marked in ink with location or alternatively kept as electronic files and marked with dates (month, day, year) of the period measured, and initialed by the individual who removes the chart from the device. Units should be indicated on the charts.</li> <li>5. The Field Research Director is responsible for inspection, maintenance, and calibration of the equipment.</li> <li>6. Since the Field Research Director does not control weather monitoring devices, weather data may not meet requirements for GLP.</li> <li>7. Automated weather monitoring equipment is preferred when available. Hard copies of weather data from automated monitoring equipment should be included in trial reports.</li> <li>8. If automated equipment is not available, weather data should be recorded manually in an experiment station logbook and maintained on file at the station. The data can be transferred from there to the final report.</li> </ol>	

<b>SOP 9.7</b>	
<b>TITLE:</b>	Maintenance of Monitoring, Data Generating Devices and GPS Unit.
<b>PURPOSE:</b>	To assure monitoring and data generating devices under the control of the Field Research Director are reasonably accurate and in good working order.
<b>SCOPE:</b>	All IR-4 field research trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. All temperature monitoring devices under the Field Research Director's control used to gather data in field or storage should be periodically tested to determine that they are accurate comparison to high quality thermometer.</li> <li>2. Batteries will be changed annually, or more frequently if necessary, in monitoring and data generating devices.</li> <li>3. A handheld GPS unit may be used to determine the coordinates of the plot corners and the distance to permanent landmarks. At the beginning of the field season the GPS unit readings will be verified for accuracy and precision against permanent known locations. Three readings will be taken and reported to establish accuracy. Readings within 2 meters of the location are considered accurate. The GPS unit will be charged as often as needed. The results of the annual verification of the permanent site and any maintenance to the unit will be noted on the annual GPS Log Form.</li> <li>4. Monitoring devices that give inconsistent results or that are not in between the following ranges should be replaced or repaired.           <ol style="list-style-type: none"> <li>a) Air temperature thermometer: <math>\pm 2</math> °F</li> <li>b) Weather monitoring equipment: <math>\pm 5\%</math></li> <li>c) Temperature loggers: <math>\pm 2</math> °F</li> <li>d) GPS unit: <math>\pm 2</math> meters</li> <li>e) GLP Electronic Balance: <math>\pm 1\%</math></li> <li>f) pH meter: <math>\pm 10\%</math></li> </ol> </li> <li>5. A written or electronic record in the Equipment Maintenance and Calibration logs, will record the dates and results of the annual testing.</li> </ol>	

## **SOP 9.8**

<b>TITLE:</b>	Data Archiving and Retention
<b>PURPOSE:</b>	Data archiving, retention and Quality Control review
<b>SCOPE:</b>	All IR-4 field research lab.

### **PROCEDURES:**

1. The official archive for original raw data will be located at IR-4 headquarters.
2. The Field Research Director will make an exact copy of the original raw data including completed paper or electronic forms, maintenance logs, weather data, personnel forms, etc. These copies will be retained in a secure location at the OSU CFAES Wooster Campus.
3. All information in the Field Research Director's file should be clearly identified.
4. All original raw data not included in the paper Field Data Book, will be sent directly to IR-4 Headquarters with a chain of custody form including name of courier, tracking number and inventory of items sent.
5. All completed paper FDB or eFDB will be submitted to the Regional Field Coordinator to review for completeness and accuracy. The Regional Field Coordinator will follow up to obtain any missing data or correct deficiencies with the Field Research Director's consent.
6. The Field Research Director will add any additional or changed pages to the paper FDB or eFDB and these updated pages will be used for all subsequent quality control or quality assurance reviews and audits.

<b>SOP 9.9</b>	
<b>TITLE:</b>	Equipment not Requiring SOPs
<b>PURPOSE:</b>	To identify what type of equipment will not require an SOP
<b>SCOPE:</b>	Equipment used in IR-4 research trials
<b>PROCEDURES:</b>  1. The equipment used in trials that require an SOP are: a. Application Equipment: SOP 6.2, 6.3, 6.4. b. Electronic balances: SOP 7.6, 10.7 c. Automated Data Collection/ Recording Devices: SOP 9.6. d. GPS unit: SOP 9.6.  2. All other equipment used to conduct an IR-4 field trial will not require an SOP.  3. As new equipment is acquired, the Field Research Director will determine whether it requires an SOP.	



<b>SOP 10.1</b>	
<b>TITLE:</b>	Residue Sample Collection, Storage, and Shipping.
<b>PURPOSE:</b>	To describe procedures for harvesting, handling, storing, and shipping.
<b>SCOPE:</b>	All IR-4 field trials from which residue samples are required.
<b>PROCEDURES:</b> <ol style="list-style-type: none"> <li>1. All residue samples will be handled according to the SOP and the study protocol.</li> <li>2. The use of a GLP maintained balance is preferred but not required. Follow SOP 10.7 for use of a GLP maintained balance.</li> <li>3. Residue samples will be handled and stored in such a way as to ensure their integrity upon arrival at the analysis laboratory.</li> </ol>	

<b>SOP 10.2</b>	
<b>TITLE:</b>	Collecting Residue Samples
<b>PURPOSE:</b>	To assure that representative residue samples are collected and that their integrity is maintained.
<b>SCOPE:</b>	All IR-4 field trials from which residue samples are required.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. At the beginning of each growing season, the Field Research Director will prepare a Master Timetable for all projects. The Master Timetable will include project planting, treatment, and sample collection dates. Depending on the protocol, samples may be required at a specific number of days after treatment, at the earliest commercial harvest, or at some other predetermined time. Sample collection dates may be adjusted as the season progresses, and the dates modified on the Master Timetable.</li> <li>2. Avoid collecting samples during rain, unless it is necessary to do so to meet a time requirement in the protocol.</li> <li>3. Collect samples from untreated plots first, then proceed to the lowest and sequentially higher dosages. Collect all samples from each subplot of a treatment before proceeding to the next treatment.</li> <li>4. Consult the protocol to determine the sample size and sampling method. If no instructions are given, collect 2 to 4 lb of good quality product from each subplot.</li> <li>5. If 2 lb of product is not available collect as much as possible, and describe in the paper FDB or eFDB any reasons for the small sample size.</li> <li>6. Do not wash or clean sample product unless directed to do so by protocol.</li> <li>7. Avoid cross contamination of samples during harvesting and handling by wearing disposable surgical gloves and changing the gloves between samples.</li> <li>8. The Pre Harvest Interval (PHI), prompted in Part 7A of the Field Data Book is calculated by counting the day after the last application up to and including the day of harvest.</li> <li>9. After harvest, treated rows of annual crops will be mowed, disked, or otherwise destroyed. Date of this action will be noted in the paper FDB or eFDB.</li> <li>10. Treated rows or trees of perennial crops will be marked with a sign which will indicate that fruit should not be picked and/or eaten and plot should not be entered.</li> </ol>	

<b>SOP 10.3</b>	
<b>TITLE:</b>	Sample Containers and Identification
<b>PURPOSE:</b>	To specify how samples are to be identified.
<b>SCOPE:</b>	All IR-4 field trials requiring residue samples.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Prior to sample collection, obtain from the IR-4 Regional Field Coordinator a sufficient number of IR-4 plastic lined cloth bags for the trial. If these bags are not available, use any clean sampling bags suitable to preserving the integrity of the samples. Double plastic bags are usually sufficient. Plastic, food type bags may be used for sample collection. These are placed inside of cloth bags after sampling is completed.</li> <li>2. Before sampling, label each IR-4 plastic lined cloth bag with waterproof ink with the following information:             <ol style="list-style-type: none"> <li>a. Field Trial Identification Number</li> <li>b. Crop fraction</li> <li>c. Test substance</li> <li>d. Treatment number</li> <li>e. Sample number</li> <li>f. Harvest date</li> <li>g. Sampling date</li> <li>h. Investigator: Name/ Phone</li> </ol> </li> <li>3. Each plastic, food type bag should be labeled with the following information:             <ol style="list-style-type: none"> <li>a. Field Trial Identification Number</li> <li>b. Crop fraction</li> <li>c. Test substance</li> <li>d. Treatment number</li> <li>e. Sample number</li> <li>f. Harvest date</li> <li>g. Sampling date</li> </ol> </li> <li>4. If needed, fill out a Sample Identification Card for each sample bag. Sample I.D. cards should contain the following information:             <ol style="list-style-type: none"> <li>a. Field Trial Identification Number</li> <li>b. Crop fraction</li> <li>c. Test substance</li> <li>d. Treatment number</li> <li>e. Sample number</li> <li>f. Harvest date</li> <li>g. Sampling date</li> </ol> </li> <li>5. Place each card in a moisture proof container and place it inside the plastic food type bag with the harvested sample.</li> <li>6. Place the plastic bag with the harvested sample in the IR-4 plastic lined cloth bag and tie bag closed securely.</li> </ol>	

<b>SOP 10.4</b>	
<b>TITLE:</b>	Sample Packing and Storage.
<b>PURPOSE:</b>	To assure the integrity of the samples after collection.
<b>SCOPE:</b>	All IR-4 field research trials where residue samples are collected.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Place the sample as it is collected into a plastic sample bag marked for that sample. If available, place the Sample Identification Card into the bag.</li> <li>2. Expel excess air and close the plastic sample bag. Place plastic sample bag into marked IR-4 cloth sample bag. Tie bag securely closed.</li> <li>3. Place a filled sample bag into cooler or other appropriate container containing blue ice and transport to freezer or lab if additional sample preparation is required. Treated and untreated samples may be shipped in the same carton unless specified differently in the protocol. Samples will remain in the freezer until shipped.</li> <li>4. A freezer log of IR-4 samples will be maintained indicating for each harvest the following:             <ol style="list-style-type: none"> <li>a. Study I.D. number</li> <li>b. Time and date samples were placed in freezer</li> <li>c. Time and date of removal from freezer</li> </ol>             Each entry should be dated and initialed by individual making the entry.           </li> <li>5. Maintain a record of storage temperature and submit the records to the paper FDB or eFDB upon completion of the trial.</li> </ol>	

<b>SOP 10.5</b>	
<b>TITLE:</b>	Maintaining Freezer Storage Systems.
<b>PURPOSE:</b>	To maintain the integrity of all frozen samples held as part of IR-4 GLP residue studies.
<b>SCOPE:</b>	All IR-4 field research trials where residue samples are collected.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Freezers located in the OSU CFAES Weed Lab in Gourley Hall will be maintained for use as sample storage for residue samples that must be frozen. The freezers will be capable of achieving and maintaining temperatures consistent with those requested in trial protocols.</li> <li>2. If samples are not to be frozen, they must be kept in a suitable location, with monitored temperature and limited access.</li> <li>3. Maintenance records, including routine and non-routine maintenance, will be kept for the freezer storage facility.             <ol style="list-style-type: none"> <li>a. Routine maintenance is the result of normal wear.</li> <li>b. Non-routine maintenance is the result of equipment malfunction.</li> </ol> </li> <li>4. Prior to the first harvest of each season, the freezer will be inspected and the temperature range confirmed.</li> <li>5. While GLP samples are present in the freezer, access to those samples will be restricted.</li> <li>6. All GLP samples will be designated as such to separate them from non-GLP samples. All samples will be stored in such a way as to prevent contamination.</li> <li>7. Temperature conditions in the freezer will be monitored continually using appropriate thermometers or data loggers from the time of the first harvest of the season to the time of shipment of the last set of samples. Temporary spikes resulting from addition or packing of samples are acceptable.</li> <li>8. A freezer contents log, documenting the movement of samples to and from the freezer, will be maintained. This log, or a copy, will be placed in the appropriate paper FDBs or eFDB.</li> <li>9. The freezer is connected to a wireless alarm system in the event that the freezer temperature goes below -40 or above 20F. This system is not maintained under GLP guidelines and is intended only to monitor freezer conditions.</li> <li>10. If the alarm is activated, record the time and temperature on the freezer temperature log. Once the temperature is restored to the freezer unit, record the freezer temperature and time in the freezer temperature log.</li> </ol>	

## **SOP 10.5**

11. The temperature of the freezers will be checked annually using an NIST thermometer and recorded in a maintenance log along with the date. Note whether the operation is routine or non-routine.
12. In the event of a malfunction or full capacity in the primary freezers, samples may be placed in another freezer capable of sustaining temperatures at or below 0F. A data logger or thermometer will be placed in this temporary facility for as long as samples remain there.
13. If the malfunction results in a deviation from a study protocol, the deviation will be documented and the Study Director will be notified.
14. Appropriate measures will be taken to prevent contamination during temporary storage.

## SOP 10.6

<b>TITLE:</b>	Sample Shipping Procedures
<b>PURPOSE:</b>	To assure that the residue samples are shipped to the residue laboratory with no loss of integrity.
<b>SCOPE:</b>	All residue samples from IR-4 field trials

### PROCEDURES:

1. Place a copy of completed IR-4 Residue Sample Chain of Custody Form (8B) and a copy of the Sample Arrival Check Sheet (8C) into each shipping container.
2. Pack the boxes securely so that they can withstand stacking in the truck. Tape the lids shut. No dry ice is needed for shipping by freezer truck. If shipped by airfreight add dry ice in a 3:1 ratio to sample weight or 40 lb dry ice regardless of sample weight.
3. Label each shipping carton with the following information:
  - a. Name and Address of sender.
  - b. Name, address, of the residue lab receiving samples
  - c. Number of container if more than one is used
  - d. Where used, affix "Dry Ice" on two sides of the container.
  - e. Field ID number
  - f. Commodity and Pesticide
4. Ship samples by ACDS freezer truck (ACDS Trucking Inc, Phelps, NY) if possible. After harvest, contact ACDS regarding the next sample pick up date. ACDS will schedule a pick-up date and contact the Field Research Director. The Field Research Director will notify the receiving laboratory as soon as possible after the pick-up date and time are confirmed. When the truck arrives, deliver the samples directly to the truck.
5. If it is not possible to ship by freezer truck, ship by airfreight with next day delivery. Ship Airfreight Monday or Tuesday to avoid weekend arrivals.
6. After samples have been shipped send a copy of the Residue Sample Chain of Custody Form (8B) to the Regional Field Coordinator and Study Director.

## SOP 10.7

<b>TITLE:</b>	Calibration of an Electronic Balance for Sample Collection.
<b>PURPOSE:</b>	To ensure accurate sample weights.
<b>SCOPE:</b>	All IR-4 field trials requiring residue samples.

### PROCEDURES:

4. The use of a GLP maintained balance is preferred but not required.
5. When using a GLP compliant balance:
  - a. The electronic balance used to weigh samples for GLP trials shall be serviced and calibrated at a minimum of every two years.
  - b. Prior to use, visually inspect electronic balance for cleanliness. Wipe with clean moist cloth as needed. If equipped, the leveling bubble should be centered before weighing commences.
  - c. Prior to each weighing event, calibrate the balance by first establishing zero followed by weighing standard weights that bracket the weight of the samples to be weighed.
  - d. Record in the Field Data Book or Maintenance Log the date, weight of standard weights and initials of person performing this task. If the balance does not weigh within one percent of the standard weight, service will be called and another balance used.



<b>SOP 11.1</b>	
<b>TITLE:</b>	Trial Reports
<b>PURPOSE:</b>	To describe the format for reporting trial activities and results
<b>SCOPE:</b>	All IR-4 field trials
<p><b>PROCEDURES:</b></p> <p>1. All data and information from a trial will be included in the IR-4 paper FDB or eFDB, which will be submitted to the Regional Field Coordinator by the Field Research Director upon completion of the field portion of the trial.</p> <p>2. Additional forms, data, or information that may be needed to comply with standard operating procedures and GLP include:</p> <ul style="list-style-type: none"> <li>a. Organizational chart</li> <li>b. Current vita and position descriptions</li> <li>c. Pesticide log book</li> <li>d. Chemical storage recorder or thermograph records</li> <li>e. Freezer inventory log</li> <li>f. Equipment maintenance and calibration logs</li> <li>g. Balance weights verification</li> <li>h. Master timetable</li> <li>i. Freezer inventory log</li> <li>j. Freezer thermograph charts</li> <li>k. Study deviation forms</li> <li>l. Protocol change forms</li> <li>m. Correspondence concerning the trial or project</li> <li>n. Pesticide application equipment maintenance and calibration logs</li> <li>o. Global Positioning System (GPS) log</li> <li>p. Soil analysis report</li> <li>q. Weather records</li> <li>r. Maps</li> <li>s. Shipping bill of lading</li> </ul>	

<b>SOP 11.2</b>	
<b>TITLE:</b>	Completion of the IR-4 paper or electronic Field Data Book
<b>PURPOSE:</b>	To explain the use of report forms contained in the IR-4 paper or electronic Field Data Book.
<b>SCOPE:</b>	All IR-4 field trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. If using a paper FDB, all forms should be filled out legibly in indelible ink or typewritten. Mistakes should be crossed out with one line, initialed, and dated. Include the reason for the change. Use error codes where appropriate.</li> <li>2. The date format for entries in the paper or electronic Field Data Book will follow month/day/year.</li> <li>3. Use forms provided in the IR-4 paper or electronic Field Data Book. Paper blank forms may be photocopied as needed.</li> <li>4. The appropriate forms should be filled out as completely as possible within a reasonable period of time after the information is available. Data should be recorded directly into the IR-4 paper or electronic Field Data Book.</li> <li>5. If a form or section of a form does not require a response, draw a diagonal line from the top of the page or section to the bottom. Initial and date on the diagonal line or sign and date at the bottom of the page. If the requested data are not applicable, give an explanation.</li> <li>6. Number each form (e.g. Part x Page x) within each section of the IR-4 Field Data Book. Include the total number of pages in each section in the first page of that section.</li> <li>7. If raw data applies to more than one trial, the original may be kept in an applicable paper or electronic FDB until the end of the field season. Copies placed in the paper or electronic Field Data Books will be marked as a "True Copy of the Original", signed and dated, and the location of the original noted. The original may also reside in the permanent archive/ record storage facility and "True Copies", signed, dated, and indicating this location may be used in the paper or electronic Field Data Book. Within a reasonable period of time, the original documents will be transferred to Headquarters to the archives.</li> </ol>	

<b>SOP 11.3</b>	
<b>TITLE:</b>	Disposition of Completed IR-4 paper or electronic Field Data Books and Other Documentation.
<b>PURPOSE:</b>	To assure completed IR-4 paper or electronic Field Data Books reach the Field Research Coordinator as soon as possible.
<b>SCOPE:</b>	All IR-4 field trials.
<b>PROCEDURES:</b>  1. The original of the completed IR-4 paper or electronic Field Data Books and any accompanying documentation should be forwarded to the IR-4 Field Research Coordinator within a reasonable period of time after the trial is completed.  2. The Field Research Director will place a copy of the completed reports and related correspondence in the trial folder to be used for subsequent QA audits.	

<b>SOP 12.1</b>	
<b>TITLE:</b>	Archive and Record Storage
<b>PURPOSE:</b>	To assure the integrity of information and data under the control of the Field Research Director.
<b>SCOPE:</b>	All IR-4 field trials.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. A limited access facility of sufficient size to contain all records/archival material should be available at or in close proximity to the location of the Field Research Director responsible for the conduct of the trials. An index of records and materials contained in the archives should be available.</li> <li>2. The facility should be in a building with adequate fire protection.</li> <li>3. The archive for all completed IR-4 trials will be maintained at IR-4 headquarters. Raw data will be sent to IR-4 headquarters through the IR-4 Regional Field Coordinator upon completion of the trials.</li> <li>4. Within a reasonable period of time, the Field Research Director will transfer all original GLP data and other GLP records from the test site to IR-4 HQ for archival. Data and records will include: the equipment maintenance/ calibration logs, freezer content log, freezer logger temperature data, GPS calibration log, personnel forms, pesticide storage temperature monitoring data, weather and other original data forms that were used for more than one trial. An IR-4 Raw Data/Documents Transfer Form will show the inventory of all items being transferred and document the chain of custody information. The Field Research Director will hold a copy of all materials.</li> <li>5. The Field Research Director will maintain copies of the following in his archive/ record storage area:             <ol style="list-style-type: none"> <li>a. Completed IR-4 Field Data Books including the protocols, audits, and other relevant information.</li> <li>b. All original records transferred to Headquarters' archives.</li> <li>c. Current and previous editions of Standard Operating Procedures (SOP).</li> <li>d. Organizational charts, training records, job descriptions and CVs for current and former employees.</li> <li>e. Original thermograph charts from temperature monitoring devices.</li> <li>f. Any correspondence pertaining to IR-4 trials.</li> <li>g. Service records for equipment.</li> <li>h. Soil test reports.</li> <li>i. GPS plot location data.</li> <li>j. Other relevant information.</li> </ol> </li> <li>6. The Field Research Director is the designated archivist for the facility.</li> </ol>	

<b>SOP 12.2</b>	
<b>TITLE:</b>	Retention Times for Documents in Archives.
<b>PURPOSE:</b>	To assure that data and documents are retained as long as required.
<b>SCOPE:</b>	All IR-4 field trials.
<b>PROCEDURES:</b>  1. Data supporting the registration of a pesticide use pattern should be retained for the life of registration.  2. Data that is not used in support of the registration of a pesticide use pattern should be held for 2 years following the date of the completion of the study. It may only be discarded with written approval of the Study Director.	

<b>SOP 14.1</b>	
<b>TITLE:</b>	Procedures to Follow prior to an EPA Inspection.
<b>PURPOSE:</b>	To provide guidance to OSU personnel in responding to a request for an EPA audit, inspection or review.
<b>SCOPE:</b>	All IR-4 research trials in the Department of Horticulture and Crop Science at the Ohio State University.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Notify the Study Director and Regional Field Coordinator of the pending audit or review as soon as possible.</li> <li>2. Have available as much as possible all personnel directly involved in IR-4 trials in HCS, OSU/CFAES Wooster Campus.</li> <li>3. Make sure that someone who is authorized to accept the Notice of Inspection will be present at the start and finish of the inspection.</li> <li>4. Prepare trial and/or facility personnel for the inspection.             <ol style="list-style-type: none"> <li>a. Discuss position descriptions with technical personnel so they understand and can explain their role in the trial.</li> <li>b. Discuss possible questions that may likely come up about the trial or facility and make sure everyone understands what to expect.</li> <li>c. Instruct personnel to respond specifically to the questions asked and not to provide extraneous information. Do not provide any information unless asked.</li> <li>d. Be certain that all documents relevant to the trial and facilities are available, including:                 <ol style="list-style-type: none"> <li>1) Master schedule for the field research director.</li> <li>2) Study Protocol and current and historical Standard Operating Procedures.</li> <li>3) Raw data, correspondence and logs.</li> <li>4) Training records and CVs of personnel involved in the audited trial.</li> <li>5) Documentation of test substance characterization, receipt and handling.</li> <li>6) Maintenance/Calibration logs on equipment.</li> </ol> </li> </ol> </li> <li>5. Have available the organizational charts and a map of the facility.</li> </ol>	

<b>SOP 14.2</b>	
<b>TITLE:</b>	Procedures to Follow during EPA Inspection.
<b>PURPOSE:</b>	To provide the guidance to trial personnel in responding to a request for an EPA audit/inspection or review.
<b>SCOPE:</b>	All IR-4 research trials in the Department of Horticulture and Crop Science at the Ohio State University.
<p><b>PROCEDURES:</b></p> <ol style="list-style-type: none"> <li>1. Greet the inspection team and follow any institutional procedures for signing in. Escort the entire group to the meeting room.</li> <li>2. At the opening of the conference ask the lead inspector for his/her credentials and for any opening statements.</li> <li>3. Introduce the facility personnel present and state their function in the facility or trial. Identify the person who will accept the Notice of Inspection.</li> <li>4. Ask the lead inspector for his or her agenda for the inspection.</li> <li>5. Proceed with the inspection.       <ol style="list-style-type: none"> <li>a. Provide documents requested and provide explanations as needed.</li> <li>b. Keep notes of observations and of all interviews</li> <li>c. Keep IR-4 management informed of the progress of the inspection and the findings.</li> </ol> </li> </ol>	

## SOP 14.3

<b>TITLE:</b>	Procedures to Follow after the EPA Inspection.
<b>PURPOSE:</b>	To provide guidance to personnel in responding to a request for an EPA audit/inspection or review.
<b>SCOPE:</b>	All IR-4 research trials in the Department of Horticulture and Crop Science at the Ohio State University.

### PROCEDURES:

1. The Field Research Director must be present for the closeout conference.
2. If the inspector's comments are in error, call this to the inspector's attention.
3. If you have corrected any problems during the inspection make sure that the corrections are so noted in the inspector's logbook.
4. Have someone take accurate notes or record the closeout conference on tape if taping is acceptable to the inspectors.
5. Be sure you obtain copies of documents or other materials that may be taken as exhibits by the inspectors.
6. Inform site personnel, Regional Field Coordinator, and the Study Director of any problems found.
7. Respond to deficiencies as required.
8. Keep Study Director informed of any activity related to the inspection.